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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/512,400	02/24/00	GELORME	J Y0999 510

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Riddles Alvin Joseph  
Candlewood Isle  
Box 34  
New Fairfield CT 06812

EXAMINER  
JOHNSON, J

ART UNIT  
1725

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/512,400	GELORME ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jonathan Johnson	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

**Status**

- 1) Responsive to communication(s) filed on 24 February 2000.
- 2a) This action is **FINAL**.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) Claim(s) 1-13 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-10 is/are rejected.
- 7) Claim(s) 11-13 is/are objected to.
- 8) Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved.
- 12) The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. § 119**

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
  - a) All b) Some \* c) None of the CERTIFIED copies of the priority documents have been:
    1. received.
    2. received in Application No. (Series Code / Serial Number) \_\_\_\_\_.
    3. received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

**Attachment(s)**

- |  |  |
|--|--|
| 15) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                               | 18) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 16) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                      | 19) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 17) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ . | 20) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Claim Objections***

Claims 1, 8, 9, and 10 are objected to because of the following informalities: The independent claims do not clearly state in the preamble they are method claims. Please change the beginning of the preamble to read “A method for manufacturing an electronic apparatus...” Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. (Development...) in view of Kawakita et al. (5,652,042) and Zhou et al. (5,985,456).

Kang et al. teaches an adhesive paste having random sizes of micrometer diameter particles coated with a low melting temperature metal (Page 1031 Column 2, 2<sup>nd</sup> paragraph); and suspended in a vehicle of a mixture of thermosetting resins (Abstract).

Kawakita et al. teaches introducing the adhesive paste into at least one via hole in at least one insulating layer (Abstract and Figure 4, Item 203).

Zhou et al. teaches mixing a flux with a thermosetting resin (Column 2, Lines 15-25).

Kang et al., Kawakita et al., and Zhou et al. are analogous art because they are from the same field of endeavor, which is methods of applying solder to electronic components. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the paste as taught by Kang et al. to utilize a via hole in order to obtain a reliable connection while maintaining a high density (see Kawakita et al. Column 1, Lines 10-30) and further to modify combined paste and via hole invention of Kang et al. and Kawakita et al. to utilize a flux mixed with a thermosetting resin in order to reduce the capillary action of the filler (see Zhou et al. Column 2, Lines 10-25).

Although Kang et al., Kawakita et al., and Zhou et al. does not explicitly teach subjecting the combination of adhesive paste in the at least one via hole in at least one insulating layer to a vehicle curing cycle including heat of the order of said low melting temperature of the metal and pressure, the examiner takes official notice that using a minimum amount of heat to melt the metal is well known in the art in order to protect the PCB by minimizing its exposure to the harmful effects of high temperature.

With respect to Claim 2, the teachings of Kang et al., Kawakita et al., and Zhou et al. are the same as relied upon in the rejection of Claim 1. Kang et al. teaches the particles are composed of Cu, Ni, Co, Ag, PD, Pt, polymer and ceramic (Page 1031, Figure Item Cu); and the particles are in the range of 5-7 micrometers (see Page 1033, Figure 3). If it is found the particles of Kang et al. do not exactly meet the tolerance of 5-7 micrometers, the examiner takes official notice that the exact size tolerance is an optimization of ranges that would have been obtainable without undue experimentation.

With respect to Claim 3, the teachings of Kang et al., Kawakita et al., and Zhou et al. are the same as relied upon in the rejection of Claim 1. Kang et al. teaches a low melting temperature material is taken from Sn-Pb (Page 1031, Column 2, 2<sup>nd</sup> paragraph)

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al., Kawakita et al., and Zhou et al. as applied to claim 1 above, and further in view of Kang et al. (IEEE Transactions).

With respect to Claim 4, Kang (IEEE Transactions) teaches the thermosetting resins are taken from a cyclo-aliphatic epoxy, phenoxy polymer, and monofunctional limonene oxide (Page 18 Column 2, First Paragraph). The examiner takes official notice that in epoxys are well known in the art and, in its most general interpretation, are considered phenoxy polymers.

Kang et al., Kawakita et al., Zhou et al. and Kang (IEEE Transactions) are analogous art because they are from the same field of endeavor, which is methods of applying solder to electronic components. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the paste as taught by Kang et al. to utilize an epoxy resin in order to increase the joint strength (see Kang, Pg. 1032, Paragraph 2).

With respect to Claim 5, the teachings of Kang et al., Kawakita et al., and Zhou et al. are the same as relied upon in the rejection of Claim 3.

Kang (IEEE Transactions) teaches the thermosetting resins are taken from a cyclo-aliphatic epoxy, phenoxy polymer, and monofunctional limonene oxide (Page 18 Column 2,

First Paragraph). The examiner takes official notice that in epoxys are well known in the art and, in its most general interpretation, are considered phenoxy polymers.

Zhou et al. teaches mixing a flux with a thermosetting resin (Column 2, Lines 15-25).

Kang et al., Kawakita et al., Zhou et al. and Kang (IEEE Transactions) are analogous art because they are from the same field of endeavor, which is methods of applying solder to electronic components. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the paste as taught by Kang et al. to utilize an epoxy resin in order to increase the joint strength (see Kang, Pg. 1032, Paragraph 2) and further to modify the combined invention of Kang et al. and Kawakita et al. to utilize a flux mixed with a thermosetting resin in order to reduce the capillary action of the filler (see Zhou et al. Column 2, Lines 10-25).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al., Kawakita et al., and Zhou et al. as applied to claim 1 above, and further in view of Kang et al. (IEEE Transactions).

Kang (IEEE Transactions) teaches the thermosetting resins are taken from a cyclo-aliphatic epoxy, phenoxy polymer, and monofunctional limonene oxide (Page 18 Column 2, First Paragraph). The examiner takes official notice that in epoxys are well known in the art and, in its most general interpretation, are considered phenoxy polymers. Kang also teaches the particles are made of Cu (Abstract).

The examiner takes official notice that Bi-Sn solder is well known in the art for its use as a low temperature solder in electronic applications.

The examiner takes official notice that the use of a Bi-Sn solder is an obvious variant to the use of a Sn-Pb solder as both can be used to solder an electronic component at a low-temperature. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a Bi-Sn solder for a Sn-Pb solder with a reasonable expectation that they would provide the functional equivalence of bonding electronic components at a low temperature.

Kang et al., Kawakita et al., Zhou et al. and Kang (IEEE Transactions) are analogous art because they are from the same field of endeavor, which is methods of applying solder to electronic components. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the paste as taught by Kang et al. to utilize an epoxy resin in order to increase the joint strength (see Kang, Pg. 1032, Paragraph 2).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al., Kawakita et al., and Zhou et al. as applied to claim 1 above, and further in view of Kang et al. (IEEE Transactions).

Kang (IEEE Transactions) teaches the thermosetting resins are taken from a cyclo-aliphatic epoxy, phenoxy polymer, and monofunctional limonene oxide (Page 18 Column 2, First Paragraph). The examiner takes official notice that in epoxys are well known in the art and, in its most general interpretation, are considered phenoxy polymers. Kang also teaches the particles are made of Cu (Abstract).

The examiner takes official notice that Bi-Sn solder is well known in the art for its use as a low temperature solder in electronic applications.

The examiner takes official notice that the use of a Bi-Sn solder is an obvious variant to the use of a Sn-Pb solder as both can be used to solder an electronic component at a low-temperature. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a Bi-Sn solder for a Sn-Pb solder with a reasonable expectation that they would provide the functional equivalence of bonding electronic components at a low temperature.

Kang et al., Kawakita et al., Zhou et al. and Kang (IEEE Transactions) are analogous art because they are from the same field of endeavor, which is methods of applying solder to electronic components. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the paste as taught by Kang et al. to utilize an epoxy resin in order to increase the joint strength (see Kang, Pg. 1032, Paragraph 2).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. (Development...) in view of Kawakita et al. (5,652,042), Zhou et al. (5,985,456), and Kang et al. (IEEE Transactions).

Kang et al. teaches an adhesive paste having random sizes of micrometer diameter particles coated with a low melting temperature metal (Page 1031 Column 2, 2<sup>nd</sup> paragraph); and suspended in a vehicle of a mixture of thermosetting resins (Abstract); the particles are composed of Cu, Ni, Co, Ag, PD, Pt, polymer and ceramic (Page 1031, Figure Item Cu); and the particles are in the range of 5-7 micrometers (see Page 1033, Figure 3). If it is found the particles of Kang et al. do not exactly meet the tolerance of 5-7 micrometers, the examiner takes official notice that the exact size tolerance is an optimization of ranges that would have been obtainable without undue experimentation.

Kang (IEEE Transactions) teaches the thermosetting resins are taken from a cyclo-aliphatic epoxy, phenoxy polymer, and monofunctional limonene oxide (Page 18 Column 2, First Paragraph). The examiner takes official notice that in epoxys are well known in the art and, in its most general interpretation, are considered phenoxy polymers.

Kawakita et al. teaches introducing the adhesive paste into at least one via hole in at least one insulating layer (Abstract and Figure 4, Item 203).

Zhou et al. teaches mixing a flux with a thermosetting resin (Column 2, Lines 15-25).

Kang et al., Kawakita et al., Zhou et al., and Kang et al. (IEEE Transactions) are analogous art because they are from the same field of endeavor, which is methods of applying solder to electronic components. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the paste as taught by Kang et al. to utilize a via hole in order to obtain a reliable connection while maintaining a high density (see Kawakita et al. Column 1, Lines 10-30) and further to modify combined paste and via hole invention of Kang et al. and Kawakita et al. to utilize an epoxy resin in order to increase the joint strength (see Kang, Pg. 1032, Paragraph 2); and further to modify the combined invention of Kang et al. and Kawakita et al. to utilize a flux mixed with a thermosetting resin in order to reduce the capillary action of the filler (see Zhou et al. Column 2, Lines 10-25).

Although Kang et al., Kawakita et al., Zhou et al., and Kang et al. (IEEE Transactions) does not explicitly teach subjecting the combination of adhesive paste in the at least one via hole in at least one insulating layer to a vehicle curing cycle including heat of the order of said low melting temperature of the metal and pressure, the examiner takes official notice that using a

minimum amount of heat to melt the metal is well known in the art in order to protect the PCB by minimizing its exposure to the harmful effects of high temperature.

The examiner takes official notice that Bi-Sn solder is well known in the art for its use as a low temperature solder in electronic applications.

The examiner takes official notice that the use of a Bi-Sn solder is an obvious variant to the use of a Sn-Pb solder as both can be used to solder an electronic component at a low-temperature. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a Bi-Sn solder for a Sn-Pb solder with a reasonable expectation that they would provide the functional equivalence of bonding electronic components at a low temperature.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. (Development...) in view of Kawakita et al. (5,652,042), Zhou et al. (5,985,456) and Kang et al. (IEEE Transactions),.

Kang et al. teaches an adhesive paste having random sizes of micrometer diameter particles coated with a low melting temperature metal (Page 1031 Column 2, 2<sup>nd</sup> paragraph); and suspended in a vehicle of a mixture of thermosetting resins (Abstract); the particles are composed of Cu, Ni, Co, Ag, PD, Pt, polymer and ceramic (Page 1031, Figure Item Cu); and the particles are in the range of 5-7 micrometers (see Page 1033, Figure 3). If it is found the particles of Kang et al. do not exactly meet the tolerance of 5-7 micrometers, the examiner takes official notice that the exact size tolerance is an optimization of ranges that would have been obtainable without undue experimentation. Kang (IEEE Transactions) also teaches the

thermosetting resins are taken from a cyclo-aliphatic epoxy, phenoxy polymer, and monofunctional limonene oxide (Page 18 Column 2, First Paragraph). The examiner takes official notice that in epoxys are well known in the art and, in its most general interpretation, are considered phenoxy polymers.

Kawakita et al. teaches introducing the adhesive paste into at least one via hole in at least one insulating layer (Abstract and Figure 4, Item 203).

Zhou et al. teaches mixing a flux with a thermosetting resin (Column 2, Lines 15-25).

Kang et al., Kawakita et al., and Zhou et al. are analogous art because they are from the same field of endeavor, which is methods of applying solder to electronic components. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the paste as taught by Kang et al. to utilize a via hole in order to obtain a reliable connection while maintaining a high density (see Kawakita et al. Column 1, Lines 10-30) and further to modify combined paste and via hole invention of Kang et al. and Kawakita et al. to utilize an epoxy resin in order to increase the joint strength (see Kang, Pg. 1032, Paragraph 2); and further to modify the combined invention of Kang et al. and Kawakita et al. to utilize a flux mixed with a thermosetting resin in order to reduce the capillary action of the filler (see Zhou et al. Column 2, Lines 10-25).

Although Kang et al., Kang et al. (IEEE Transactions), Kawakita et al., and Zhou et al. does not explicitly teach subjecting the combination of adhesive paste in the at least one via hole in at least one insulating layer to a vehicle curing cycle including heat of the order of said low melting temperature of the metal and pressure, the examiner takes official notice that using a

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The examiner takes official notice that Bi-Sn solder is well known in the art for its use as a low temperature solder in electronic applications.

The examiner takes official notice that the use of a Bi-Sn solder is an obvious variant to the use of a Sn-Pb solder as both can be used to solder an electronic component at a low-temperature. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a Bi-Sn solder for a Sn-Pb solder with a reasonable expectation that they would provide the functional equivalence of bonding electronic components at a low temperature.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. (Development...) in view of Kawakita et al. (5,652,042) and Zhou et al. (5,985,456) and Kang et al. (IEEE Transactions),.

Kang et al. teaches an adhesive paste having random sizes of micrometer diameter particles coated with a low melting temperature metal (Page 1031 Column 2, 2<sup>nd</sup> paragraph); and suspended in a vehicle of a mixture of thermosetting resins (Abstract); the particles are composed of Cu, Ni, Co, Ag, PD, Pt, polymer and ceramic (Page 1031, Figure Item Cu); and the particles are in the range of 5-7 micrometers (see Page 1033, Figure 3). If it is found the particles of Kang et al. do not exactly meet the tolerance of 5-7 micrometers, the examiner takes official notice that the exact size tolerance is an optimization of ranges that would have been obtainable without undue experimentation. Kang (IEEE Transactions) also teaches the

thermosetting resins are taken from a cyclo-aliphatic epoxy, phenoxy polymer, and monofunctional limonene oxide (Page 18 Column 2, First Paragraph). The examiner takes official notice that in epoxys are well known in the art and, in its most general interpretation, are considered phenoxy polymers.

Kawakita et al. teaches introducing the adhesive paste into at least one via hole in at least one insulating layer (Abstract and Figure 4, Item 203).

Zhou et al. teaches mixing a flux with a thermosetting resin (Column 2, Lines 15-25).

Kang et al., Kang et al. (IEEE Transactions), Kawakita et al., and Zhou et al. are analogous art because they are from the same field of endeavor, which is methods of applying solder to electronic components. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the paste as taught by Kang et al. to utilize a via hole in order to obtain a reliable connection while maintaining a high density (see Kawakita et al. Column 1, Lines 10-30) and further to modify combined paste and via hole invention of Kang et al. and Kawakita et al. to utilize an epoxy resin in order to increase the joint strength (see Kang, Pg. 1032, Paragraph 2); and further to modify the combined invention of Kang et al. and Kawakita et al. to utilize a flux mixed with a thermosetting resin in order to reduce the capillary action of the filler (see Zhou et al. Column 2, Lines 10-25).

Although Kang et al., Kang et al. (IEEE Transactions), Kawakita et al., and Zhou et al. does not explicitly teach subjecting the combination of adhesive paste in the at least one via hole in at least one insulating layer to a vehicle curing cycle including heat of the order of said low melting temperature of the metal and pressure, the examiner takes official notice that using a

minimum amount of heat to melt the metal is well known in the art in order to protect the PCB by minimizing its exposure to the harmful effects of high temperature.

The examiner takes official notice that Bi-Sn solder is well known in the art for its use as a low temperature solder in electronic applications.

The examiner takes official notice that the use of a Bi-Sn solder is an obvious variant to the use of a Sn-Pb solder as both can be used to solder an electronic component at a low-temperature. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a Bi-Sn solder for a Sn-Pb solder with a reasonable expectation that they would provide the functional equivalence of bonding electronic components at a low temperature.

#### *Allowable Subject Matter*

Claims 11-13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance: The prior art of record does not suggest or teach a method for manufacturing an electronic apparatus, particularly the exactly composition of the epoxy and phenoxy polymer and flux.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamamoto et al. (5,865,934) and Christie et al. (5,089,440) are cited of interest.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Johnson whose telephone number is 703-308-0667. The examiner can normally be reached on M-Th 7AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 703-308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7718 for regular communications and 703-305-5885 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

jj JJ  
July 11, 2000

  
Patrick Ryan  
Supervisory Patent Examiner  
Technology Center 1700